

Safety & Buildings Division  
201 West Washington Avenue  
P.O. Box 2658  
Madison, WI 53701-2658

## Wisconsin Building Products Evaluation

Material

Fire-Rated Ductwork  
Flamebar BW11

Manufacturers

Illingworth-Kilgust Mechanical  
615 S. 89<sup>th</sup> Street  
Milwaukee, WI 53214

Firespray International Ltd  
Flamebar House, South Road Templefields  
Harlow Essex CM20 2AR  
England

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### SCOPE OF EVALUATION

**GENERAL:** This report evaluates Flamebar BW11 fire rated ductwork, manufactured by Illingworth-Kilgust Mechanical. Flamebar BW11 fire rated ductwork was evaluated for use as smoke extract and pressurization ductwork, grease ducts serving Type I hoods, and in lieu of providing fire rated shafts, to the applicable codes listed below.

The **Comm** code requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1 & 2 family dwellings:**

- **There are no requirements.**

The **IBC** requirements below in accordance with the current **Wisconsin Amended 2006 ICC Code:**

#### **Fire Resistance Rated Construction:**

- **Duct System:** Flamebar BW11 fire rated ductwork was evaluated in accordance with the general requirements of **s. IBC 707** and may be used in lieu of a rated shaft.
- **Prescriptive Fire Resistance Assemblies:** Flamebar BW11 fire rated ductwork was evaluated in accordance with the general requirements of **s. IBC 719.1, Table 720.1(2) and Table 720.1(3).**

This review includes the cited **International Mechanical 2006 Code (IMC)** requirements below in accordance with the current **Wisconsin Commercial Building Code:**

- **Grease Duct Materials:** Flamebar BW11 fire rated ductwork was evaluated in accordance with **s. IMC 506.3.1.1 (Exception)**
- **Grease Duct Enclosure:** Flamebar BW11 fire rated ductwork was evaluated in accordance with **s. IMC 506.3.10., Exception 1.**
- **Commercial Kitchen Hoods:** Flamebar BW11 fire rated ductwork was evaluated in accordance with the general requirements of **s. IMC 507.**

## **DESCRIPTION AND USE**

### **In Lieu of Fire Rated Shafts:**

**The Flamebar BW11 fire rated ductwork:** Flamebar BW11 fire rated ductwork is manufactured to specific standards to provide fire resistance up to and including **4 hours** for stability, integrity and insulation fire ratings for: smoke outlet and grease ductwork, non-domestic kitchen, basement and enclosed car park extract systems, escape route ducts, etc.

### **Grease Duct – ASTM E2336**

Flamebar BW11 fire rated ductwork is constructed from 20 gauge galvanized sheet steel, reinforced with 3/16-inch angle iron at the ends and at the centerline of the duct sections, then degreased and factory sprayed with Flamebar BW11 a water based compound. The coating contains mineral fillers in a low permeable elastomeric binder to a thickness of approximately 1mm.

Flamebar BW11 fire rated ductwork systems utilize two layers of **Unifrax FyreWrap Max 2.0 or equivalent wrap having been recognized as having met ASTM E 2336.**

Flamebar BW11 fire rated ductwork is produced in flanged sections and is assembled on site utilizing tested fireproof gaskets and caulk.

**Unifrax FyreWrap Max 2.0:** Unifrax FyreWrap Max 2.0 duct insulation incorporates Insulfrax® Thermal Insulation as its core material. Insulfrax is a high temperature insulation made from a calcia, magnesia, silica chemistry designed to enhance biosolubility. The core insulation blanket is completely encapsulated in a poly-aluminum foil fiberglass reinforced scrim covering. The scrim provides handling strength and protection from grease vapor absorption and tearing. A typical box of certified material bears the Intertek mark (OPL Logo).

### **Grease Duct – ISO-6944:**

Flamebar BW11 fire rated ductwork grease is constructed from 20 gauge galvanized sheet steel per Flamebar Standards, degreased and factory sprayed with Flamebar BW11 a water based compound. The coating contains mineral fillers in a low permeable elastomeric binder to a thickness of approximately 1 mm.

Flamebar fire rated grease ductwork utilize (1) layer of minimum 2” thick mineral (rock) wool insulation having a density ranged from 6.4 to 7.0 lbs/ft<sup>3</sup> (102 to 112 kg/m<sup>3</sup>) with a glass fiber scrim on one surface as an encapsulating material.

Flamebar BW11 fire rated ductwork is produced in flanged sections and is assembled on site utilizing tested fireproof gaskets and/or caulk.

## **TESTS AND RESULTS**

The tests and results listed below cover the current **Wisconsin Amended 2006 IBC** and **IMC Code** requirements:

### **Grease Duct –ASTM E2336:**

- **Grease Duct Enclosure:** Flamebar BW11 fire rated ductwork was tested in accordance with **s. IMC 506.3.10., Exception 1.**

Flamebar BW11 fire rated ductwork, inclusive of galvanized 20 gauge sheet steel, when used with the Unifrax FyreWrap Max 2.0 will maintain compliance with **ASTM E2336** Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems Fire Resistance Test.

Flamebar BW11 fire rated ductwork is an Intertek certified product under the Intertek Quality Control Manual 3114842SAT007.

Unifrax FyreWrap Max 2.0 is an Intertek certified product under the Intertek Quality Control Manual 16341-1,2,3,4,5.

**In Lieu of Fire Rated Shafts and Grease Duct – ISO 6944:**

A fire test was conducted on a ventilation duct, consisting of galvanized 20 gauge sheet steel, coated on its outside with a proprietary coating material identified as Flamebar BW11, and was clad on its outside with a mineral (rock) wool insulation material having a minimum thickness of 2 inches (50 mm) with a glass fiber scrim on one surface. The density of the mineral wool ranged from 6.4 to 7.0 lbs/ft<sup>3</sup> (102 to 112 kg/m<sup>3</sup>).

The test measured the ability of representative duct assemblies to resist the spread of fire from one compartment to another (without the aid of fire dampers) where the ducts pass through fire separations. The test also determined stability, integrity and insulation ratings as defined by ISO 6944-1985, and to establish UL Classification on the Flamebar BW11 ventilation duct as a “coated duct” for fire resistive duct assemblies.

The test was conducted in accordance with Standard ISO 6944-1985: Fire Resistance Tests – Ventilation Ducts (for Duct A External Fire Exposure), except Duct A did not include one sharp bend of the same cross sectional area as the main duct and a T-piece to form a short branch duct as required by the Standard.

Paragraph 3.6 of the Standard ISO 6944-1985 allows the omission of portions of the test described, provided that the duct concerned is not required, in practice, to meet all of the conditions anticipated by the test.

The fire test described in Test Record No. 1 was conducted at the facilities of the Loss Prevention Council, Borhamwood, United Kingdom and witnessed by a representative of Underwriter’s Laboratories, Inc.

The test report also included a section titled, “Study for Classification Purposes”, to consider the following:

1. An evaluation of fire resistance tests described in Technical Evaluation Report CC85644 of the Loss Prevention Council to determine the stability, integrity and insulation ratings of both insulated and un-insulated duct assemblies.
2. To determine compliance to ANSI/UL 1479 for both insulated and un-insulated Flamebar BW11 coated duct assemblies. See **Note** below.

**Note:** Neither of the assemblies described in Reports TE82414 and TE84033 were subjected to a hose stream test as required by ANSI/UL 1479, the materials used as part of the penetration seal of either assembly were not evaluated for compliance with the hose stream requirements of ANSI/UL 1479. Instead, the submitter requested the substitution of any UL Classified mortar shown in the Fill, Void or Cavity Material Category of the Fire Resistance Directory. The request is acceptable, because all of the manufacturer’s mortar had been subjected to fire and hose stream tests per ANSI/UL 1479 for rating periods involved. It was judged that the ventilation duct reinforcement at the penetration would add additional support for the mortar. The manufacturer names and mortar types are shown on Systems Nos. **C-AJ-7029 and C-AJ-7030**.

The fire test was supplemented by other tests and examinations to provide information on the composition and physical properties of the materials used in the test assembly.

Based upon the results of the fire exposure test and Study for Classification purposes described in the test report, Ventilation Duct Assembly Nos. **V-5** and **V-6** were promulgated in the UL Building Materials Directory. In addition, Through-Penetration Firestop Systems Nos. **C-AJ-7029 and C-AJ-7030** were promulgated in the UL Fire Resistance Directory.

## **LIMITATIONS OF APPROVAL**

The limitations below are in accordance with the current **Wisconsin Amended 2006 ICC Code**:

Flamebar BW11 fire rated ductwork is approved as an **alternative** to a one-, up to four-hour fire-resistance rated shaft enclosure for **commercial kitchen grease** and **air ventilation ducts** when constructed in accordance with this approval and the manufacturer's installation recommendations. **Flamebar** fire rated ductwork is also approved as a method of reducing clearance to combustible materials to zero with construction in accordance with this approval and the manufacturer's installation recommendations.

Flamebar BW11 fire rated ductwork constructed with Unifrax FyreWrap Max 2.0 is approved as a method of reducing clearance to combustible materials to zero when constructed in accordance with this approval and the manufacturer's installation recommendations involving Unifrax FyreWrap Max 2.0 or equivalent wrap in accordance with ASTM E2336 for commercial kitchen grease ducts (2 hour fire resistance rated)

Unifrax FyreWrap Max 2.0, when used to enclose Flamebar BW11 fire rated ductwork, shall be held in place via bands, straps and/or pins with securing washers of sizes, lengths, spacing and means of attachment as defined by the manufacturer's installation guidelines. Such information is required to be on-site and made available to a Department representative upon request in so as to be in compliance with **s. IMC/Comm 64.0313(3)**.

Flamebar BW11 fire rated ductwork constructed with mineral (rock) wool insulation material having a minimum thickness of 2 inches (50 mm) with a density ranged from 102 to 112 kg/m<sup>3</sup> (6.4 to 7.0 lbs/ft<sup>3</sup>) is also approved as an **alternative** to a one-, up to four-hour fire-resistance rated shaft enclosure for **commercial kitchen grease** ducts when constructed in accordance with this approval and the manufacturer's installation recommendations.

Flamebar BW11 fire rated ductwork constructed with mineral (rock) wool insulation material having a minimum thickness of 2 inches (50 mm) with a density ranged from 102 to 112 kg/m<sup>3</sup> (6.4 to 7.0 lbs/ft<sup>3</sup>) is also approved as a method of reducing clearance to combustible materials to zero when constructed in accordance with this approval and the manufacturer's installation recommendations involving mineral wool insulation in accordance with ISO 6644.

Mineral (rock) wool, when used in a minimum 2" thickness and with a density ranged from 102 to 112 kg/m<sup>3</sup> (6.4 to 7.0 lbs/ft<sup>3</sup>) to enclose Flamebar BW11 fire rated ductwork, shall be held in place via pins with securing washers of sizes, lengths, spacing and means of attachment as defined by the manufacturer's installation guidelines. Such information is required to be on-site and made available to a Department representative upon request in so as to be in compliance with **s. IMC/Comm 64.0313(3)**.

The **IMC** limitations below are in accordance with the current **Wisconsin Amended 2006 IMC Code**:

- **Ducts Serving Type I Hoods:** the duct shall comply with the requirements of **s. IMC 506.3**.
- **Joints and Seals:** of grease shall comply with **s. IMC 506.3.2 (Exception 3) and Comm 64.0506(2)**.
- **Supports:** for grease ducts shall comply with **s. IMC 506.3.3**.
- **Cleanouts and Openings:** grease duct access doors shall comply with **s. IMC 506.3.8 & 506.3.9**.
- **Duct Enclosure:** the Flamebar BW11 fire rated ductwork system complies with **s. IMC 506.3.10 Exception 1**.
- **Commercial Kitchen Hoods:** the Flamebar BW11 fire rated ductwork system is allowed for use in accordance with the general requirements of **s. IMC 507**.
- **Materials Exposed within Plenums:** the Flamebar BW11 fire rated ductwork system complies with the requirements of **s. IMC 602.2.1**.

This review is limited to the Flamebar BW11 fire rated ductwork system constructed as described in the **DESCRIPTION AND USE** section of this approval, and the fire resistive systems described in the **TESTS AND RESULTS** section of this approval. Use of any components other than those listed in the **TESTS AND RESULTS** section of this approval for purposes other than those listed in this approval **has not been evaluated**.

This approval will be valid through December 31, 2014, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

**DISCLAIMER**

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: 10/15/2009

By: \_\_\_\_\_

Randall R. Dahmen  
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